

AMENDMENTS TO THE CLAIMS:

The following listing of claims replaces all prior listings, and all prior versions, of claims in the application.

LISTING OF CLAIMS:

1. (Cancelled).
2. (Currently amended) The functioning substrate according to Claim 24 4 characterized in that said group of columnar micro pillars is self-supporting.
3. (Currently amended) The functioning substrate according to Claim 24 4 characterized in that the aspect ratio of ~~the equivalent diameter (D)~~ to the height (H) to the equivalent diameter (D) of said columnar micro pillars (H/D) is 8 through 30.
4. (Currently amended) The functioning substrate containing a group of columnar micro pillars according to Claim 24 4 characterized in that the equivalent diameter of the tip end of said group of columnar micro pillars is smaller than that of the bottom surface.
5. (Currently amended) The functioning substrate containing a group of columnar micro pillars according to Claim 24 4 characterized in that the said group of columnar micro pillars has a portion tapering from the root in contact with said first matrix toward the tip end.
6. (Currently amended) The functioning substrate according to claim 24

4, wherein at least part of the micro pillars has at its tip portion an expanded portion in the diametric direction.

7. (Currently amended) The functioning substrate containing a group of columnar micro pillars according to Claim 24 4 characterized in that at least the surface of said group of columnar micro pillars is made of a substance mainly composed of a water-repellent and/or oil-repellent organic polymer.

8. (Currently amended) The functioning substrate containing a group of columnar micro pillars according to Claim 24 4 characterized in that at least a part of the surface of said group of columnar micro pillars is provided with metal plating.

9. (Original) An optical device comprising:
a first matrix of organic polymer; and
a group of columnar micro pillars of organic polymer extending from said matrix;

wherein the tip end of said group of columnar micro pillars is in contact with a the second matrix, the equivalent diameter of said group of columnar micro pillars is 10 nm through 10 μ m with a height of 50 nm through 10 μ m, and the aspect ratio of the micro pillars of said group of columnar micro pillars is 4 or more;

said optical device being further characterized in that said group of columnar micro pillars is arranged in such a way as to form at least one optical path, and one or more light incoming sections and one or more light outgoing sections are provided.

10. (Currently amended) The functioning substrate according to Claim 24 characterized in that part of said pillars is lacked to form clearances having a predetermined spacing.

11. (Original) A micro biochip characterized in that a group of micro pillars made of a material including an organic polymer is formed on the matrix surface of an organic polymer, and the equivalent diameter of said micro pillar group is 10 nm through 100 μm with a height of 0.5 μm through 500 μm ; said micro biochip further characterized in that the aspect ratio of said micro pillar is 4 or more.

12. (Original) The micro biochip according to Claim 11 characterized in that the organic polymer is modified on the surface of said micro pillar.

13. (Original) The micro biochip according to Claim 11 characterized in that the organic polymer contains at least one of antigen, sugar chain and bases.

14. (Original) The micro biochip according to Claim 11 characterized in that a plurality of micro pillar groups of organic polymer are provided in a flow path for feeding a sample and the tip end of said micro pillar is kept in contact with the upper substrate constituting the flow path.

15. (Cancelled).

16. (Currently amended) A method for manufacturing a functioning substrate equipped with a group of columnar micro pillars according to Claim 13,

characterized in that a spacer made of inorganic material is formed on the first substrate and a material membrane is formed on the surface including said spacer, said method comprises the steps of:

pressing said mold against said membrane,

separating said mold, and

bringing a ~~the~~ second matrix in contact with the tip end of said group of columnar micro pillars through said spacer and fixing it thereon.

17. (Original) A functioning substrate having a group of micro pillars made of organic polymer, wherein the micro pillars are self-supporting and arranged on a base member supporting the micro pillars, and wherein each of the micro pillars has an aspect ratio of 4 or larger, a diameter of 1 μm or less, and a height of 100 μm or less.

18. (Original) The functioning substrate according to claim 16, wherein the equivalent diameter of one end of the micro pillars is smaller than that of the other end of the micro pillars, the ends of the micro pillars that have the smaller diameter being connected to the supporting member.

19. (Original) The functioning substrate according to claim 16, wherein a plurality of layers of the micro pillars are supported on the supporting member, each of the layers being bonded to supporting members.

20. (Currently amended) The functioning substrate according to Claim 24 4, wherein each of said columnar micro pillars has a length greater than a depth of

respective pits of a mold used in forming said columnar micro pillars.

21. (Currently amended) The functioning substrate according to Claim 24 4, wherein said group of columnar micro pillars are columnar micro pillars formed by pressing a mold having pits against said organic polymer, the organic polymer entering the pits so as to form pillars, and removing the mold, the pillars being stretched upon removal of the mold to form said columnar micro pillars.

22. (Currently amended) The functioning substrate according to Claim 24 4, wherein said organic polymer is a material such that by pressing a molding having pits against said organic polymer, the organic polymer entering the pits so as to form pillars, and then removing the mold, the organic material is stretched upon removal of the mold so as to form the columnar micro pillars.

23. (Currently amended) The functioning substrate according to Claim 24 4, wherein the columnar micro pillars have a first diameter at said matrix, and a second diameter at a position intermediate the height of the columnar micro pillars, and wherein the first diameter is greater than the second diameter.

24. (New) A functioning substrate with a group of columnar micro pillars, comprising:

a first matrix of thermoplastic organic polymer; and
the group of columnar micro pillars, of thermoplastic organic polymer, elongating from said matrix,
wherein said at least one group of columnar micro pillars are columnar micro

pillars formed by pressing a mold, having pits, against the first matrix such that material of the columnar micro pillars is pressed into the pits, and separating the mold therefrom, thereby to elongate the columnar micro pillars from said matrix.

25. (New) The functioning substrate according to claim 24, wherein the aspect ratio of height (H) to equivalent diameter (D) of each of said columnar micro pillars (H/D) is 4 or more.

26. (New) The functioning substrate according to claim 24, wherein the equivalent diameter (D) of each of said columnar micro pillars is in a range of 10 nm through 500 μ m, the height (H) thereof is in a range of 50 nm through 5000 μ m, and (D) < (H).

27. (New) A method for manufacturing a functioning substrate equipped with a group of columnar micro pillars, the group of columnar micro pillars being arranged on a matrix composed of a material mainly of thermoplastic organic polymer so as to constitute a predetermined pattern, and which is provided using a mold with multiple pits which each have an equivalent diameter of 10 microns or less,

said method comprising steps of:

applying pressure to said mold, having said multiple pits, which is composed of a material harder than the material of which said matrix is composed, so as to press part of said material of which said matrix is composed into said pits,

separating said mold from said material of which said matrix is composed,
and

stretching at least part of said material, of which said matrix is composed,
which has been pressed into said pits, thereby forming the group of columnar micro
pillars.